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(54) **Carrier made of sheet material, device and method for recognizing bundles made from an assembly of a number of layers of sheet material on such a carrier**

(57) Carrier made of sheet material, intended in particular for use as the base sheet for a number of layers of sheet material, in particular sheets with labels, which assembly of layers and carrier have to be divided into various bundles, which carrier on at least one side comprises a pattern which is made of mutually differing pattern parts, which pattern parts are of such shape and

dimensions that of the bundles from the assembly produced the initial position in the assembly can be determined by means of the pattern parts, and the bundles can then be identified, and also method and device for identifying bundles.

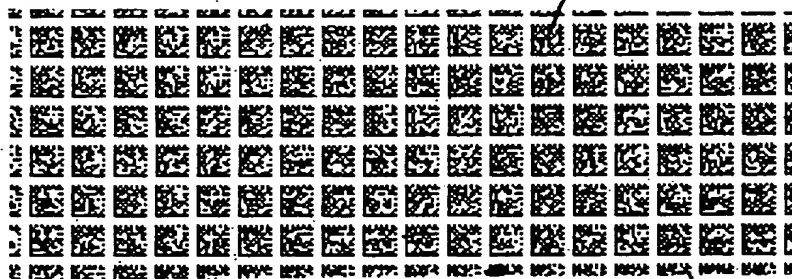


Fig. 3

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Description

The present invention relates firstly to a carrier made of sheet material, intended in particular for use as the base sheet for a number of layers of sheet material, in particular sheets with labels, which assembly of layers and carrier have to be divided into various bundles.

Carriers made of sheet material are generally known and are used for supporting one or more layers of sheet material. Sheet material, both as regards the carrier and as regards the layers supported by it, should be understood here as a material whose thickness is very low compared with the surface dimensions, so in other words both thin sheet and thicker sheeting or plate material.

When an assembly of carrier and a number of layers of sheet material is being separated into smaller portions, by cutting, stamping etc., the smaller stacks obtained are called bundles. These bundles are not limited to a particular shape.

The supported sheet material is not particularly limited and can vary from textile material and paper to metal etc. The number of layers in practice is more than one and depends on the type of sheet material, since a smaller number of layers is often stacked in the case of metal than in the case of sheets of paper. In the case of paper sheets with, for example, labels approximately 1,000 sheets will generally be present on a carrier.

For the sake of simplicity, the only sheet material discussed below will be paper sheets which are printed with labels, but it will be clear that the invention is not restricted thereto and also extends to all other types of sheet material which have to be subjected to a processing operation in order to produce stacks or bundles of smaller portions thereof.

The carrier need not necessarily be a separate sheet, but can be in the form of one of the layers of sheet material.

During the production of labels, labels are printed on sheets with generally large numbers of labels per sheet. These printed sheets are stacked on a carrier made of sheet material, following which bundles of the labels in question are cut or stamped out of the stack of sheets. Various types of labels are often printed on one sheet, making it necessary to sort the bundles of labels after the cutting operation. The bundles are then generally provided with a wrapper and packed.

In practice, the sorting of bundles of labels is carried out manually, which is very labour-intensive and highly susceptible to mistakes. Carelessness and tiredness play an important role here and, apart from that, there is often only a very slight difference in appearance between the various bundles of labels, which makes visual sorting by hand difficult.

In order to avoid the abovementioned problems, a more clearly distinguishable mark, such as a number or the like, is often placed on each label on the top sheet of the stack prior to cutting. However, this necessitates a separate printing operation for each batch of labels, which is expensive and time-consuming.

EP-B-0,476,398 discloses a device and a method for marking the bundles to be cut out in the case of stacks of sheet textile material. For this purpose, a small label is applied prior to the cutting at the position of the bundles to be cut out. After the cutting out of the bundles concerned, said bundles can then be identified and sorted, possibly in an automated process. The prior labelling of the bundles to be cut out means that a labelling unit and an additional processing step are needed. Another disadvantage is that the labelling is batch-dependent, in other words, for each new and different batch of bundles to be cut labels with a different marking printed on them must be applied in different positions.

The object of the present invention is to solve the abovementioned problems, and to that end the invention provides a carrier made of sheet material, intended in particular for use as the base sheet for a number of layers of sheet material, in particular sheets with labels, which assembly of layers and carrier have to be divided into various bundles, which carrier is characterized in that on at least one side it comprises a pattern which is made of mutually differing pattern parts, which pattern parts are of such shape and dimensions that of the bundles produced from the assembly the initial position in the assembly can be determined by means of the pattern parts, and the bundles can then be identified.

The carrier according to the invention makes it possible to identify each cut-out bundle, irrespective of the number, the shape or the position of the bundles concerned, by determining the position of the bundle in the initial assembly, starting from the recognition of a pattern part on the carrier part present underneath the bundle.

A major advantage obtained by this is that the sorting of the bundles is no longer dependent on human factors, but can be carried out automatically, and mistakes can be ruled out. Moreover, this means that the recognition and sorting of bundles is made independent of differences between batches of labels, and it is possible to work with one type of carrier sheet, which can be manufactured in advance as a standard sheet.

The pattern to be used for the carrier, made up of pattern parts, can be designed in a very large number of different ways. However, it is essential here that the pattern parts should be of such a shape and of such dimensions that all pattern parts of the entire carrier can be distinguished from each other, and that the dimensions of each pattern part compared with the dimensions of the bottom face of each bundle to be cut out are such that at least one pattern part per bundle always remains undamaged.

Many kinds of shape patterns are conceivable here, both printed shape patterns and relief shape patterns. By relief shape patterns we mean, for example, a relief applied by means of an embossment roller, or a holes pattern made by perforation.

The pattern for the carrier can be selected depending on the number and the dimensions of the bundles of labels to be cut out. If the number of labels to be cut out is small, a pattern of number and/or letter combinations

will suffice, but this will give rise to problems in the case of larger numbers and in particular in the case of small labels.

The pattern parts are preferably in the form of markings which are different from each other, and which are particularly preferably divided into columns. By columns in this respect we mean, for example a chessboard pattern.

Many possibilities for large numbers of different markings are known in the prior art. If these markings are placed on the carrier in columns, after the recognition of a marking it becomes possible to determine the position of a bundle in the initial assembly of carrier and layers, and then to identify the bundle. This also makes it possible to carry out a spot check visually on the sorting, if desired.

A very advantageous possibility for large numbers of differing markings is the so-called ID matrix codes. In particular, the markings are produced in the form of ID matrix codes which represent an ascending series of numbers.

ID matrix codes make it possible by means of a very small marking of a pattern of dots to provide a virtually unlimited number of different markings. In practice, the dimensions of the markings will vary from 0.5 x 0.5 cm to 2 x 2 cm, and preferably approximately 1 x 1 cm.

Another advantageous embodiment of the markings is to make them in the form of regions which are or can be provided with different magnetic codes. In other words, the carrier is completely covered or is covered patternwise with a material in which a magnetic code can be stored. After this, the magnetizable parts are provided patternwise with information which is different for each pattern part, so that after cutting of the bundles the respective magnetized pattern parts can be distinguished from each other.

Apart from different markings, which may be placed in a logical sequence, there are yet other possibilities. For example, the entire carrier can also be provided with any desired pattern, which pattern can be scanned by a suitable scanner prior to separation of the bundles and can be stored in a memory. These data can be used subsequently to determine the position of and identify cut bundles. Of course, what is essential here is that the pattern is such that pattern parts with certain minimum dimensions, depending on the dimensions of the bundles to be cut out, can still be distinguished from each other. The patterns used may be line patterns, colour differences, colour intensity differences and even shape differences in the surface of the carrier. The latter shape differences are, inter alia, the fibre structure of a cardboard carrier, the fibre structure of a carrier coated with fibres, the fibre structure of a carrier containing non-woven material, the surface structure of a carrier etc.

The carrier material according to the invention is advantageously a cellulose-containing material such as paper, and is preferably cardboard. Cardboard is relatively cheap, durable, strong and easy to print.

In an advantageous embodiment the carrier contains a carrier position-determining marking, for example a coloured arrow or the like, on the side opposite the side with the pattern, in order to simplify determining the orientation of the carrier relative to the orientation of the stack of sheets to be placed thereon.

For the sake of simplicity, the carrier can be provided with a pattern according to the invention on both sides, and can be provided with a carrier position-determining marking on both sides. The latter can be, for example, in a different colour which does not impede the pattern scanning.

The invention also provides a device for identifying bundles obtained starting from an assembly of a carrier according to the invention and a number of layers of sheet material, at least comprising supply and discharge means for the bundles, scanning means for scanning pattern parts present on the carrier part underneath the bundles, and a data processing unit.

The device preferably also comprises sorting means for sorting the bundles depending on the information obtained by the scanning means.

This device can be accommodated in any existing label production line, assuming that the sheets of labels are stacked in the correct orientation on a carrier according to the invention, before being cut.

The scanning means in question will depend on the markings used. In the case of a pattern of ID matrix codes, the scanning means can be in the form of an ID matrix scanner, such as a CCD matrix camera with decoder available from DALOSY B.V., Ridderkerk (The Netherlands). The data processing unit is preferably programmed in such a way that it knows the respective positions of the pattern parts, and can distinguish undamaged pattern parts or markings from those which have been damaged by cutting, and on the basis thereof can determine the initial position of the bundles in the assembly of sheets and carrier. The respective bundle of labels can then be identified through comparison with position data of the labels in the initial sheets. The position data can be obtained from, for example, the printing data of the labels. The bundle is then guided suitably by the sorting means to the discharge means.

The invention also provides a method for identifying bundles which have been obtained starting from an assembly of a carrier according to the invention and a number of layers of sheet material, which method comprises the steps of:

- scanning the pattern parts present on the carrier part of the bundles;
- by means of the scanned information determining the initial position of the bundles in the assembly of the carrier and the layers of sheet material; and
- identifying the bundles.

The bundles are advantageously sorted after identification.

Finally, the invention provides a bundle of a number of layers of sheet material obtained by dividing an assembly of layers of sheet material provided with a carrier made of sheet material, characterized in that the carrier is a carrier according to the invention. Preferably the bundle comprises a bundle of labels.

The invention will be explained in greater detail below with reference to the appended drawing, in which:

Fig. 1 shows a view in perspective of a stack of sheets with labels on a carrier sheet according to the invention;

Fig. 2 shows a bundle of labels with a part of a carrier sheet according to the invention;

Fig. 3 shows a bottom view of the bundle according to Fig. 2;

Fig. 4 shows an ID matrix code;

Figs. 5 and 6 show other examples of carrier patterns made up of pattern parts; and

Fig. 7 shows diagrammatically various units of an embodiment of a device according to the invention in a label production line.

Fig. 1 shows a stack of sheets 1 on a carrier sheet 2 according to the invention, on which sheets various types of labels 3, 4, 5 and 6 are printed. Labels 3 and 4 are the same size, but are different in appearance, while labels 5 and 6 are smaller and are also different in appearance. When such a stack of sheets is cut, bundles of the various labels are produced and can be provided with a wrapper and then packed.

Fig. 2 shows a bundle 7, comprising labels 3 and a part 8 of the carrier sheet 2.

Fig. 3 shows a bottom view of the bundle 7 of Fig. 2, in which the various markings 9 are clearly visible. A number of markings around the outside edge, for example those indicated by 10, are damaged.

Fig. 4 shows an example of an ID matrix code, which can be used, for example, as a marking 9 on a carrier sheet 2. These markings or ID matrix codes are advantageously distributed in columns over said carrier material, the value represented by the ID matrix increasing per column or row.

If the data of the pattern of markings on the carrier sheet and the distribution of the labels over each sheet, which is known from, for example, the printing operation, is stored in a memory, it is possible by reading only one of the markings underneath a bundle to determine the initial position of said bundle in the stack of sheets 1, following which the label can be identified through comparison with the position data of the labels in the memory. All bundles are therefore quickly identifiable in a very simple way.

Fig. 5 shows another embodiment of a possible carrier sheet pattern, in which the sheet is divided up like a chessboard and is also provided with intersecting groups of parallel lines, the distance between the lines in each group increasing or decreasing gradually. This ensures that all squares on the carrier sheet are unique and can

be distinguished from one another. The pattern information can be stored beforehand in a memory.

Fig. 6 shows diagrammatically the underside of a carrier sheet made of coarse cardboard, in which the fibres 15 are visible, which information could also be scanned, and on the basis of which bundles of labels subsequently cut from said carrier sheet can easily be identified through determining the initial position thereof.

Fig. 7 shows diagrammatically various units of an embodiment of a device according to the invention, the units falling within the bracket 25 belonging to the device according to the invention.

The various process steps are also clearly visible in this diagram.

Reference number 20 indicates a stack of sheets on a carrier sheet according to the invention, each sheet comprising different labels 7.

The assembly of label sheets and carrier sheet is cut in a cutting unit A into various bundles of labels 7, which are then conveyed to a scanner B, in which the underside of the respective bundles 7, in other words the underside of the carrier sheet parts, is scanned.

The scanned bundles are then conveyed to a wrapping unit C, in which a wrapper 21 is placed around the bundles 7. In a printing unit D connected downstream of the wrapping unit C information is printed on the wrapper, for example an order number, an identification code number and a counter, and possibly an information-containing code to be scanned later, such as a bar code.

Finally, the respective bundles are sorted in a sorting unit E on the basis of the information from the carrier sheet part obtained in unit B, or by in situ scanning of, for example, the bar code on the wrapper.

All units are connected in the figure to a central data processing unit F, but it will be clear that other embodiments are also possible. Not all units need be connected to the data processor F. The cutting unit A, the wrapping unit C and possibly even the sorting unit could operate independently.

The unit F contains additional information input and output devices 26 and 27 respectively for entering, for example, position data of the labels, which can be obtained from the printing process data. The information output device 27 can be connected to, for example, a display unit, a memory unit or the like.

An example of a method according to the invention for sorting bundles will now be described with reference to Fig. 7.

The sheets printed with labels are stacked on carrier sheets provided with a suitable pattern of ID matrix codes, the pattern of the carrier sheet facing downwards. The carrier position-determining marking on the carrier sheet is used here for the orientation of the sheets relative to the carrier sheet.

After the stacks of sheets 20 have been "pushed-up" (accurate alignment of all sheets through shock movements), the bundles 7 of the appropriate labels are cut out in the unit A. This is generally carried out automatically. After cutting of the bundles of labels, the bundles

are conveyed over a CCD camera in unit B, by means of which camera the pattern parts are scanned. As soon as the camera has scanned and recognized an undamaged pattern part, the initial position of said bundle in the assembly of carrier sheet and label sheets is determined by means of the central data processing unit F, following which the bundle in question is identified through comparison with the label position data.

A wrapper 21 is placed around the bundles 7 in unit C, which wrapper is provided with an order number, a counter and a bar code with desired information by means of an inkjet printer in printing unit D. Finally, the bar code is scanned in the sorting unit E, and the bundles are sorted on the basis of the bar code information. The sorting could also be carried out with the aid of the information obtained in unit B.

The use of additional markings, for example on the wrapper, is preferable on account of the further processing of the labels. A bottler or other manufacturer can thus also very easily automate identification of the bundles of labels, which means that incorrect labelling is ruled out.

Claims

1. Carrier made of sheet material, intended in particular for use as the base sheet for a number of layers of sheet material, in particular sheets with labels, which assembly of layers and carrier have to be divided into various bundles, **characterized in that** said carrier (2) on at least one side comprises a pattern which is made of mutually differing pattern parts, which pattern parts are of such shape and dimensions that of the bundles (7) produced from the assembly the initial position in the assembly (1, 2) can be determined by means of the pattern parts, and the bundles (7) can then be identified.
2. Carrier according to claim 1, **characterized in that** the pattern parts are in the form of markings (9) which are different from each other.
3. Carrier according to claim 2, **characterized in that** the markings (9) are divided into columns.
4. Carrier according to claim 2 or 3, **characterized in that** the markings (9) are in the form of ID matrix codes.
5. Carrier according to claim 4, **characterized in that** the markings (9) represent the ID matrix codes for an ascending series of numbers.
6. Carrier according to one or more of claims 1 - 3, **characterized in that** the markings are in the form of regions which are or can be provided with different magnetic codes.
7. Carrier according to one or more of the preceding claims, **characterized in that** the carrier (2) is made of cardboard.
8. Carrier according to one or more of the preceding claims, **characterized in that** the carrier (2) contains a carrier-position-determining marking on the side opposite the side with the pattern.
9. Device for identifying bundles (7) obtained starting from an assembly of a carrier (2) according to one or more of the preceding claims and a number of layers of sheet material (2), at least comprising supply and discharge means for the bundles, scanning means for scanning pattern parts present on the carrier part underneath the bundles, and a data processing unit.
10. Device according to claim 9, **characterized in that** it comprises sorting means for sorting the bundles depending on the information obtained by the scanning means.
11. Method for identifying bundles which have been obtained starting from an assembly of a carrier according to one or more of claims 1 - 8 and a number of layers of sheet material, which method comprises the steps of:
 - scanning the pattern parts present on the carrier part of the bundles;
 - by means of the scanned information determining the initial position of the bundles in the assembly of the carrier and the layers of sheet material; and
 - identifying the bundles.
12. Method according to claim 11, **characterized in that** the bundles are sorted after identification.
13. Bundle of a number of layers of sheet material obtained by dividing an assembly of layers of sheet material provided with a carrier made of sheet material, **characterized in that** the carrier is a carrier according to one or more of claims 1 - 8.
14. Bundle according to claim 13, **characterized in that** the bundle comprises a bundle of labels.

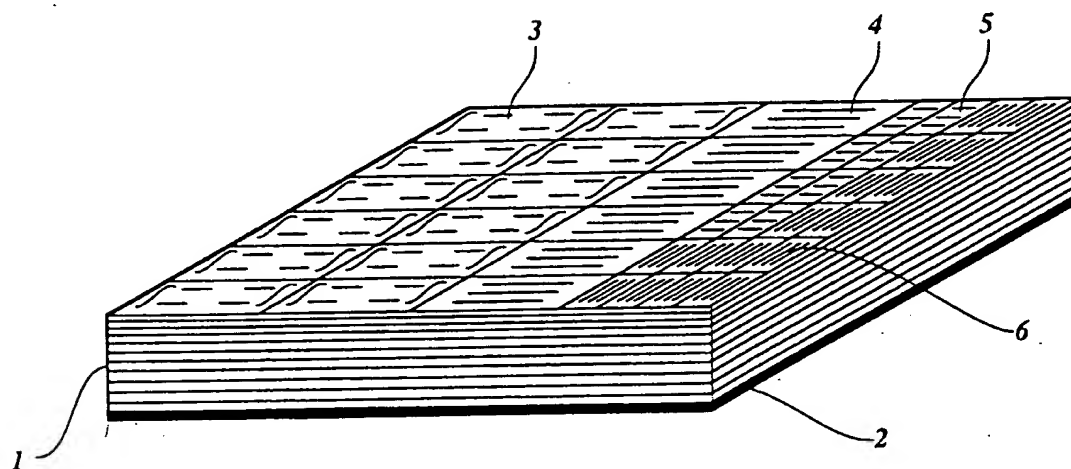


Fig. 1

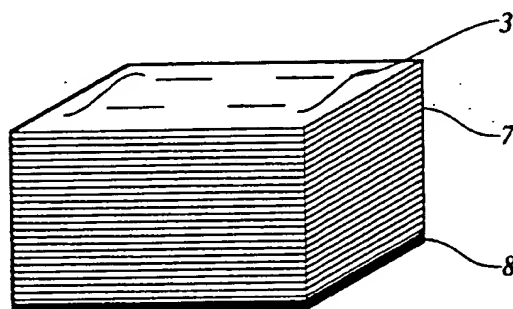


Fig. 2

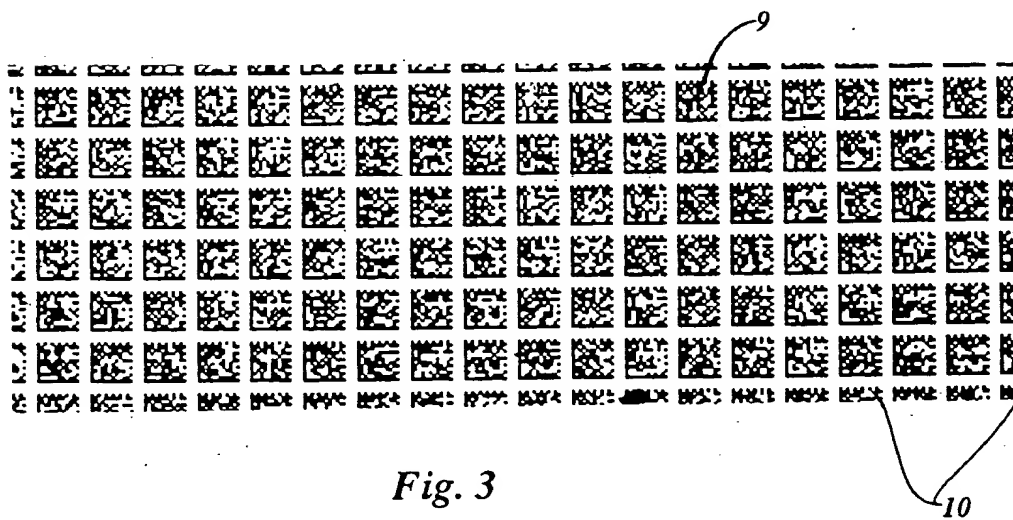


Fig. 3

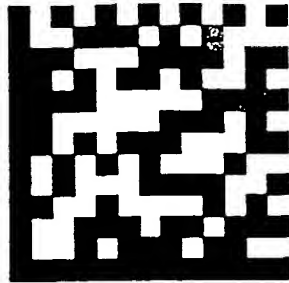


Fig. 4

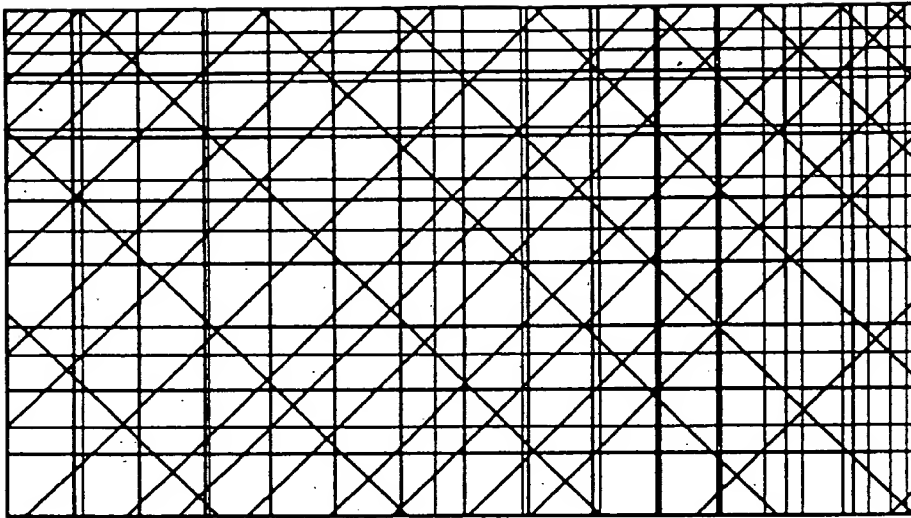


Fig. 5



Fig. 6

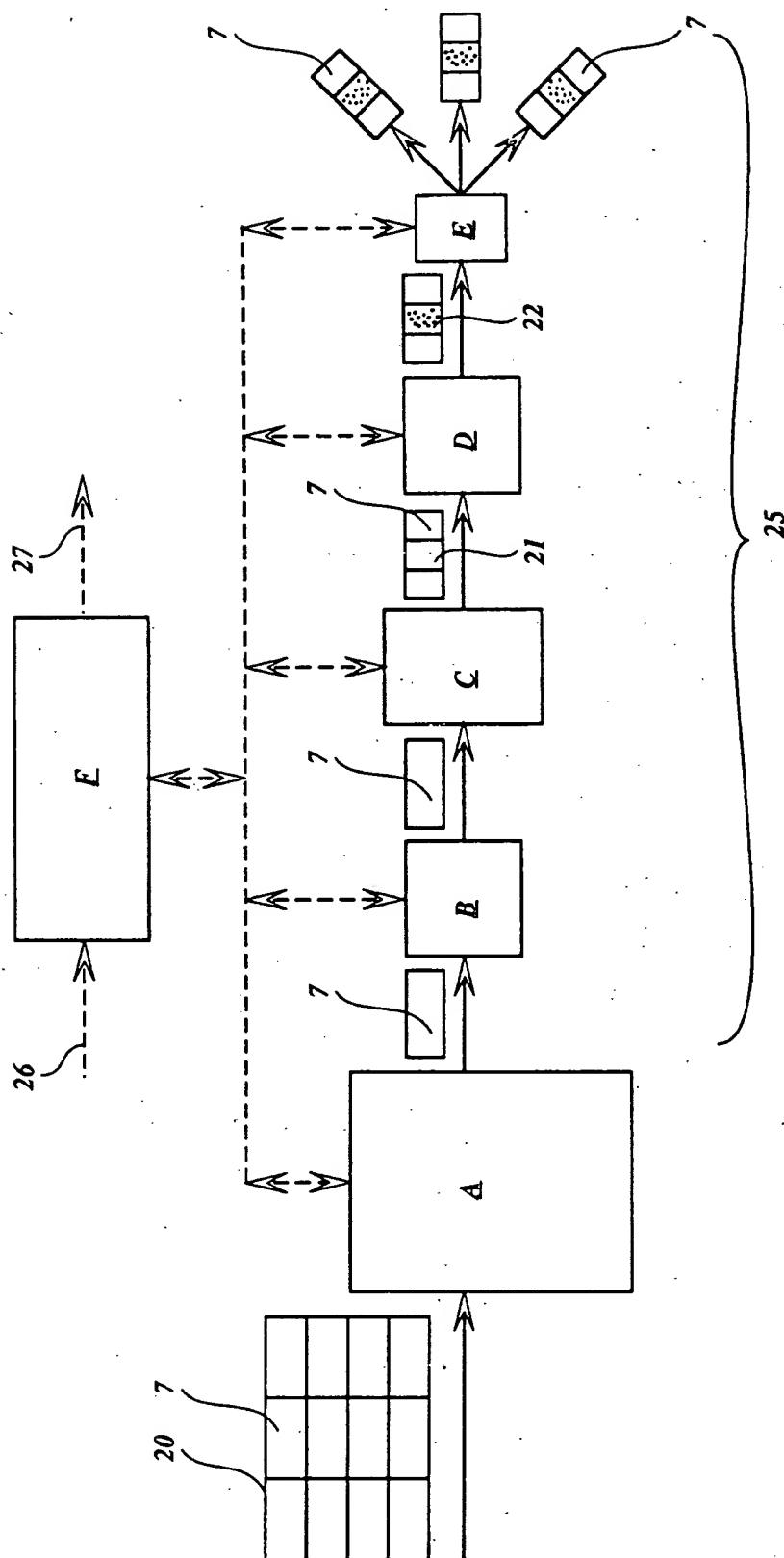


Fig. 7